**第一部分 笔试**

**Note: All answers must be writen on answer sheet!**

I．Answer the following questions and Read the following programs：（20 scores）

1．Please give three usages of overloading mechanism. ( 3 scores)

2．What does the following program output? ( 2 scores)

#include <iostream>

class V {

public:

V(){ cout << “Hello world!” << endl; }

~V(){cout << “Good Bye!” << endl; }

};

main()

{

V my;

}

3．What does the following program output? ( 4 scores)

#include <iostream>

template <class T>

class point{

public:

point(T a, T b){ x = a; y = b; }

void move(T a, T b){ x = x + a; y = y + b; }

void show(){cout<<"Current Coordinate:" << x << " " << y << endl; }

private:

T x,y;

};

void main()

{

point<int> m(3,4);

m.show();

m.move(1,2);

m.show();

point<float> n(2.5,3.4);

n.show();

n.move(1.3,2.3);

n.show();

}

4．What does the following program output? ( 3 scores)

#include<iostream >

class Vector {

public:

Vector& setx( int a ){ x = a; return \*this; }

Vector& sety( int b ){ y = b; return \*this; }

Vector& setz( int c ){ z = c; return \*this; }

void show()

{

cout << "(x,y,z)" << "=" << "(" << x << "," << y << "," << z << ")" << endl;

}

private:

int x,y,z;

};

void main()

{

Vector a;

a.setx(3).sety(4).setz(5);

a.show();

}

5. What does the following program output? ( 8 scores)

#include<iostream.h>

class A {

public:

A( int ID )

{ objectID = ID; cout << "Obj " << objectID << " is constructed!" << endl; }

A( A& a )

{ objectID = a.objectID; cout << "Obj " << objectID << " is constructed!" << endl; }

~A()

{

cout << "Obj " << objectID << " is destructed!" << endl;

}

private:

int objectID;

};

void create( void )

{

A third( 3 );

static A fourth( 4 );

}

void fun1( A ){ }

A first( 1 );

int main()

{

create();

A \*p = new A( 2 );

create();

fun1( A( 5 ) );

delete p;

return 0;

}

II．Fill in the following blanks to complete programs. （20 score）

1．According to the output, complete the following program. (10 scores)

#ifndef TEST\_H

#define TEST\_H

class B;

class A {

\_\_\_(1)\_\_\_ void f7(A&,B&);

public:

A(int,int);

void f1();

\_\_\_(2)\_\_\_ void f2();

static int m;

protected:

void f3();

private:

int x;

int y;

};

class B : protected A {

friend void f7(A& ,B& );

public:

B(int,int);

void f1();

void f2();

private:

int x;

int y;

};

class C : public A {

public:

C(int,int);

void f1 ( ) ;

void f5 ( );

void f3 ( );

private:

int x;

int y;

};

#endif

//---------------------------------

#include <iostream>

#include "test.h"

A::A(int a,int b){x=a;}

void A::f1(){cout<<"A的f1"<<endl;}

void A::f2(){cout<<"A的f2"<<endl;}

void A::f3(){cout<<"A的f3"<<endl;}

int A::m = 88;

B::B(int a,int b):A(a,b){x=a;}

void B::f1(){ \_\_\_(3)\_\_\_ cout<<"B的f1"<<endl;}

void B::f2(){cout<<"B的f2"<<endl;}

C::C(int a,int b):A(a,b){x=a;}

void C::f1 ( ) {cout<<"C的f1"<<endl;}

void C::f5 ( ){cout<<"C的f5"<<endl;}

void C::f3 ( ){ A::f3( );cout<<"C的f3"<<endl;}

void f7(A& a,B& b){cout<<"friend:"<<a.x+b.x<<endl;}

//-----------------------------

#include <iostream>

#include "test.h"

void main()

{

cout<<"-------"<<endl;

cout<< \_\_\_(4)\_\_\_ <<endl;

A a(2,3),\*p1,\*p2,\*p3;

B b(3,5);

C c(0,0);

cout<<"-------"<<endl;

c.f3();

cout<<"-------"<<endl;

p1=&a;

p2=(A \*)&b;

p3=&c;

p2->f1();

b.f1();

p3->f1();

c.f1();

cout<<"-------"<<endl;

p1->f2();

\_\_\_(5)\_\_\_->f2();

p3->f2();

cout<<"-------"<<endl;

f7(a,b);

}

Output is:

-------

88

-------

A的f3

C的f3

-------

A的f1

A的f1

B的f1

A的f1

C的f1

-------

A的f2

B的f2

A的f2

-------

friend:5

2．Assume that we want to implement a overloding function.which can write an instance of class A to output stream. Please complete the following overloding function. (10 scores)

#include <iostream>

class A {

friend \_\_(1)\_\_ operator \_\_(2)\_\_ ( ostream& \_\_(3)\_\_, \_\_(4)\_\_ my )

{

out << my.x; return \_\_(5)\_\_;

}

public:

…

private:

int x;

};

III．Write programs pies according to the requests（20 score）

1．Write an overloading member function and an overloading non-member function to implement the concatenation operator of string. For example, we can get “abcd1234” by “abcd”+”1234”. (8 scores)

2．According to the following requirements, design a class: (12 scores)

1) to include a constructor which create a n×n integer matrix(整数矩阵)by dynamic manner base on the parameter n, and initialize it to 0;

2) to include a destructor which destruct n×n integer matrix;

3) to include a utility function which print n×n integer matrix;

4) to include a *get* function which output the sum of major diagonal line（主对角线，从左上到右下）of n×n integer matrix;

5) to include a access function which create a integer matrix as following:

n = 6: (i.e. n is even) n = 5: (i.e. n is odd)

3 3 3 3 3 3 3 3 3 3 3

3 2 2 2 2 3 3 2 2 2 3

3 2 1 1 2 3 3 2 1 2 3

3 2 1 1 2 3 3 2 2 2 3

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6) to separate interface from implementation;

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3．What does the following program output? ( 4 scores)

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public:

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void show(){cout<<"Current Coordinate:" << x << " " << y << endl; }

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point<float> n(2.5,3.4);

n.show();

n.move(1.3,2.3);

n.show();

}

4．What does the following program output? ( 3 scores)

#include<iostream >

class Vector {

public:

Vector& setx( int a ){ x = a; return \*this; }

Vector& sety( int b ){ y = b; return \*this; }

Vector& setz( int c ){ z = c; return \*this; }

void show()

{

cout << "(x,y,z)" << "=" << "(" << x << "," << y << "," << z << ")" << endl;

}

private:

int x,y,z;

};

void main()

{

Vector a;

a.setx(3).sety(4).setz(5);

a.show();

}

5. What does the following program output? ( 8 scores)

#include<iostream.h>

class A {

public:

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{ objectID = ID; cout << "Obj " << objectID << " is constructed!" << endl; }

A( A& a )

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~A()

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cout << "Obj " << objectID << " is destructed!" << endl;

}

private:

int objectID;

};

void create( void )

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int main()

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create();

A \*p = new A( 2 );

create();

fun1( A( 5 ) );

delete p;

return 0;

}

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public:

A(int,int);

void f1();

\_\_\_(2)\_\_\_ void f2();

static int m;

protected:

void f3();

private:

int x;

int y;

};

class B : protected A {

friend void f7(A& ,B& );

public:

B(int,int);

void f1();

void f2();

private:

int x;

int y;

};

class C : public A {

public:

C(int,int);

void f1 ( ) ;

void f5 ( );

void f3 ( );

private:

int x;

int y;

};

#endif

//---------------------------------

#include <iostream>

#include "test.h"

A::A(int a,int b){x=a;}

void A::f1(){cout<<"A的f1"<<endl;}

void A::f2(){cout<<"A的f2"<<endl;}

void A::f3(){cout<<"A的f3"<<endl;}

int A::m = 88;

B::B(int a,int b):A(a,b){x=a;}

void B::f1(){ \_\_\_(3)\_\_\_ cout<<"B的f1"<<endl;}

void B::f2(){cout<<"B的f2"<<endl;}

C::C(int a,int b):A(a,b){x=a;}

void C::f1 ( ) {cout<<"C的f1"<<endl;}

void C::f5 ( ){cout<<"C的f5"<<endl;}

void C::f3 ( ){ A::f3( );cout<<"C的f3"<<endl;}

void f7(A& a,B& b){cout<<"friend:"<<a.x+b.x<<endl;}

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#include <iostream>

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void main()

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cout<<"-------"<<endl;

cout<< \_\_\_(4)\_\_\_ <<endl;

A a(2,3),\*p1,\*p2,\*p3;

B b(3,5);

C c(0,0);

cout<<"-------"<<endl;

c.f3();

cout<<"-------"<<endl;

p1=&a;

p2=(A \*)&b;

p3=&c;

p2->f1();

b.f1();

p3->f1();

c.f1();

cout<<"-------"<<endl;

p1->f2();

\_\_\_(5)\_\_\_->f2();

p3->f2();

cout<<"-------"<<endl;

f7(a,b);

}

Output is:

-------

88

-------

A的f3

C的f3

-------

A的f1

A的f1

B的f1

A的f1

C的f1

-------

A的f2

B的f2

A的f2

-------

friend:5

2．Assume that we want to implement a overloding function.which can write an instance of class A to output stream. Please complete the following overloding function. (10 scores)

#include <iostream>

class A {

friend \_\_(1)\_\_ operator \_\_(2)\_\_ ( ostream& \_\_(3)\_\_, \_\_(4)\_\_ my )

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public:

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